

SARRACENIA ALABAMENSIS,
A NEWLY RECOGNIZED SPECIES
FROM CENTRAL ALABAMA¹

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In February, 1953, while collecting pitcher plants at Elmore, Alabama, for taxonomic studies, we located a colony of *Sarracenia* with frozen leaves. As we were seeking plants of *S. oreophila* (Kearney) Wherry at Wherry's published range extension for that species at Elmore, and since the frozen leaves were mostly large and widely expanded at the orifice, much resembling the published photographs of the yellow flowered *S. oreophila*, which we had not at that time seen, we assumed our discovery to represent that species. When the plants flowered in our greenhouse, however, the flowers were small and red. This seemed to place the plant in *S. jonesii* Wherry, which was widely accepted at that time. After observing and growing the plant for two seasons, we became convinced that either the published description of *S. jonesii* was too narrow, or that the plant was not *S. jonesii* at all. Our next step was to visit the type locality of *S. jonesii* in North Carolina to observe and obtain plants for comparison. They proved not to be the same, so we began the studies leading to this paper.

With the help of the late Dr. R. M. Harper, who made his field notes available to us, and who, in 1955, guided us to his colonies of pitcher plants in Central Alabama, we were able to obtain a wide sampling of the population and to locate other colonies of our own. Because there has long been controversy and confusion among *Sarracenia* taxonomists over the treatment of the taxa related to *S. rubra* Walter, we visited the Elmore and Chilton County colonies eight times at various seasons in the period from 1953 to 1973 to better understand this related species.

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Since 1953, we have grown this plant, which we call the Alabama Canebrake Pitcher Plant, continuously, both in our greenhouses, and, since 1966, outdoors as well, at Saginaw, Michigan. Although its small red flowers with obovate petals indicate a close relationship to *S. rubra*, it shows a number of differences. In this connection, those interested in significant taxonomic characteristics in *Sarracenia* may wish to refer to the remarks of MacFarlane (1908), Wherry (1929, 1935), Bell (1949), and McDaniel (1966).

Unlike *Sarracenia rubra* (MacFarlane, 1908) our plant produces two types of pitchers and occasional phyllodia each season. Its spring pitchers, similar in size to the leaves of *S. rubra*, differ markedly in developing a curved form and in lacking the external dark maroon coloring of the veins, pitcher rim and hoods found in that species. The summer pitchers, straight and usually much larger and more tapered than those of *S. rubra* (excepting *S. rubra* ssp. *jonesii*), differ from those of both of those taxa in possessing a softer texture, a visibly fine pubescence, and a paler yellow-green color. The major veins are maroon colored mainly only on the inside of the pitcher tube. The hoods of the summer pitchers are from 2-8 times larger than those of summer leaves produced in *S. rubra*. The greater expansion of the hood, the stronger reflexion of the hood neck margins, the strongly rolled orifice rim, the leaf size, and overall yellowish green coloration give the summer leaves a profile more suggestive of the pitcher of *S. flava* or *S. oreophila* than of *S. rubra*.

The flowers, while less useful than the leaves for species delineation within this genus (c.f. Bell, 1949, p. 140), differ from *Sarracenia rubra* in their larger size, lighter red coloring, petal shape, in their erose petal margins, and in their fainter fragrance (Fig. 1). In addition, the plant produces flower scapes abundantly; often two or three scapes develop from one terminal growth in vigorous plants, making large flowering clumps spectacular. The regular production of multiple blooms from one terminal bud is an unusual feature in *Sarracenia*.

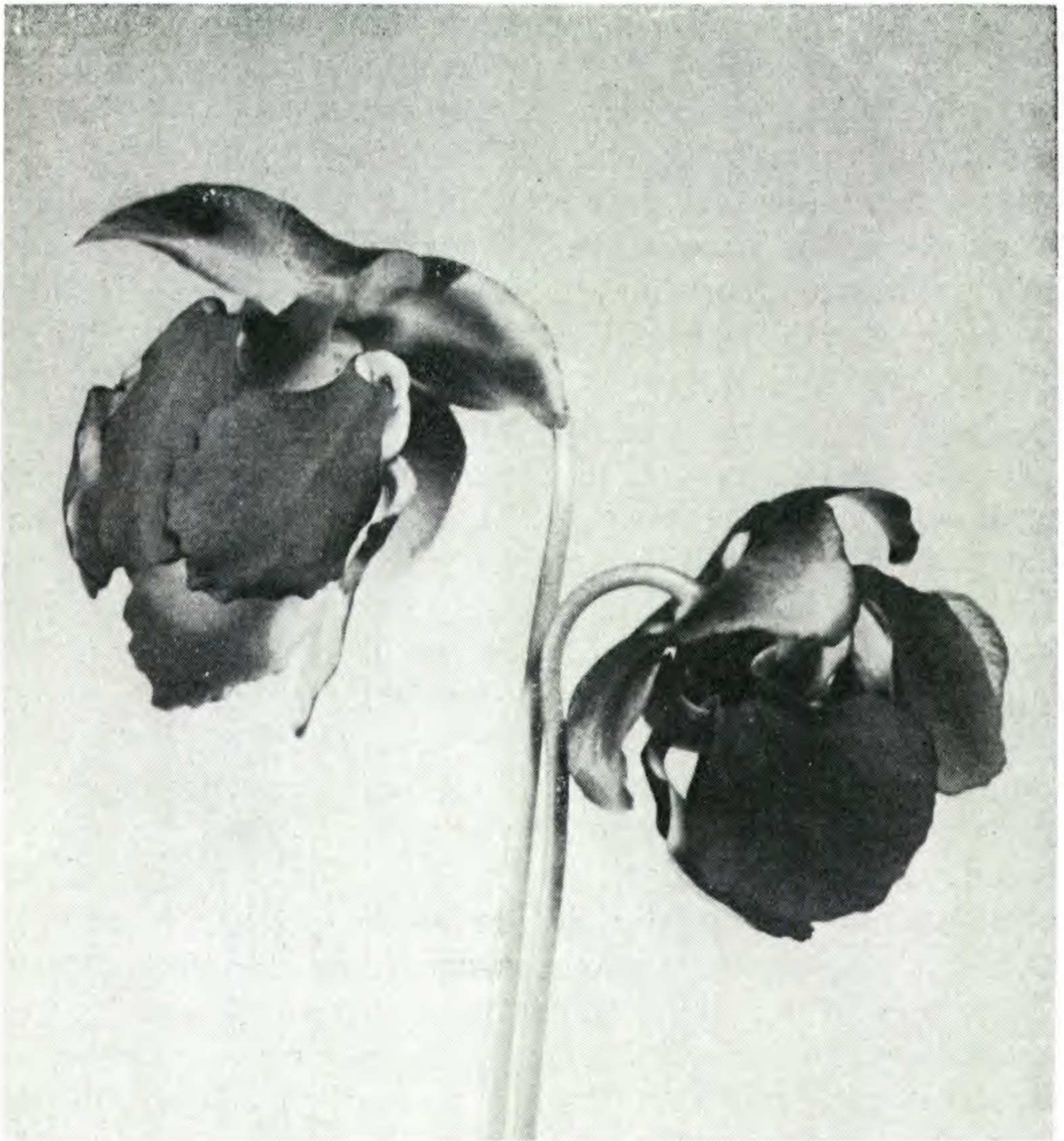


Figure 1. Comparison of flowers of *Sarracenia alabamensis*, Chilton Co. Ala., (left) and *S. rubra*, Crestview, Florida (right). Note differences in color tone, shape of petal lobe, and detail of petal margins.

Since, in addition to its structural differences, its range is disjunct from *Sarracenia rubra* and probably from that of all other species except *S. oreophila*, we consider it a distinct species.

MacFarlane (1908) has pointed out that all immature *Sarracenia* leaves tend to resemble closely those of *Sarracenia minor* Walter and do not show good specific differences. While he spoke mostly of very young pitcher

leaves, we believe that all specific differences are best displayed by the largest leaves of the season. In our description we give the usual size ranges, but we urge readers to standardize their comparisons, when possible, by examining the largest seasonal leaves of related taxa. Because we believe that vague size references without standardized points of measurement have contributed to the problems in understanding the taxa related to *S. rubra*, we have tried to be quite exact in our measurements. Pitcher length was measured from the point of attachment to the rhizome to the rim of the pitcher orifice; it does not include the hood. The length of hood refers to the distance from the narrowest part of the hood-constriction (neck) to the tip of the hood, and hood width refers to measurement across its widest point. To facilitate measurement comparisons of the tubular pitchers in fresh or herbarium material, we give width figures for pressed pitchers rather than diameters for inflated pitchers.

The panduriform petals present problems for accurate measurement comparisons, being divided into a cuneate basal portion, an isthmus, and an obovate distal portion. For purposes of comparison, the length of the basal cuneate portion of the petal was measured as the distance from the petal attachment along the median line to the widest point of the segment; the length of the distal petal lobe we measured from the widest point of the basal portion to the tip of the petal.

We have based the following description upon both cultivated specimens and those collected in the wild.

***Sarracenia alabamensis* Case & Case, sp. nov.**

Rhizoma valde ramosum, ramis confertis; *folia* trimorpha; *folia* vernalia ascidiformia, maxima plerumque plus minusve sigmoidea, tubo basi angusto, sursum gradatim ampliato, 17.7-49.5 cm. longo, 0.7-3 cm. lato; ala ventralis [adaxialis] ad medium expansa, 0.4-1.5 cm. lata, versus orem et basin attenuata; tubi venae extus plerumque incoloratae, intus atropurpureae; operculum cordatum, acu-

tum, subundulatum vel convexum, 1.9-7 cm. longum, 1.7-6 cm. latum, venis intus prope basin coloratis; collum 0.8-3 cm. latum.

Folia maxima ascidiformia aestivalia quam vernalia multo majora, foliis *S. flavae* vel *S. oreophilae* similia, suberecta, recta vel subsigmoidea, extus dense pubescentia, 24.5-48.5 cm. longa, ad basin longe angustata, in quarta parte superiore parum ampliata, 3.1-6.7 cm. lata; peristomium valde revolutum, adaxiale incisum; ascidii textura tenuis, mollis, ex salmoneo flavo-viridis, demum pallide flavo-viridis; tubus prope orem extus obscure areolatus, areolis albidis, venis intus valde purpureis, extus plerumque (maximis interdum exceptis) incoloratis; operculum magnum, expansum, cordatum, fere tam latum quam longum, 3.7-9.5 cm. longum, 3.4-8.6 cm. latum; collum 1.3-3.4 cm. latum; textura inter venulas convexa; operculum salmoneum, demum pallide flavo-viride, intus (necnon praecipue collum peristomiumque) iridescens.

Phyllodia laminaria pauca, interdum e gemmis terminalibus majoribus oriunda, ascidia vernalia sequentia, aestivalia praecedentia, prope basin valde recurvata, ultra medium latiora, apicem versus denuo recurvata, 4-6.5 cm. longa, 0.3-0.8 cm. lata.

Folia squamiformia pauca, triangularia, amplitudine admodum variabilis.

Scapi numerosi, interdum aliquot per ramulum terminalem, 34.5-57.6 cm. longi.

Calyx applanatus 4.5-6 cm. latus.

Sepala ovata, rotundata vel subacuta, 1.7-2.6 cm. longa, 1.1-2.2 cm. lata, sub anthesi falcato-incurvata, ovarium mox cingentia, demum patentia vel reflexa, marginibus vetustate valde revolutis.

Petala panduriformia, 3.4-4.6 cm. longa, extus sanguinea (anglice "Oxblood Red"); pars basalis cuneata 0.7-1 cm. longa, basi 0.3-0.4 cm. lata, maxime 0.9-1.1 cm. lata; constrictio mediana marginibus reflexis; lamina ultra constrictionem in isthmum brevem parallelilateralem tum in lobum

obovatum erose marginatum 2.7-3.6 cm. longum, 1.8-2.5 cm. latum expansa.

Ovarium tuberculatum, paullo compressum, 0.8 cm. longum, 0.9 cm. latum. Stylus umbraculiformis, umbraculo valde convexo, 3.5-4.2 cm. lato.

TYPE: Alabama: ELMORE CO.: very rare and local in wet gravelly or peaty soil and around springheads and rills in open grassy swales, and in thickets of *Rhododendron*, *Alnus*, *Magnolia virginiana*, *Rhus vernix* and *Arundinaria tecta*; along the railroad between Elmore and Speigner. Type plant collected in June 1971, Case & Case S-500 (US), but all specimens prepared from clonal divisions grown in our greenhouse and taken May 1, 1972 (flowering) and July 27, 1972 (large summer leaves).

REPRESENTATIVE SPECIMENS EXAMINED

Alabama: CHILTON CO.: Clanton, Pollard & Mason (US); sloping gravelly bog near Jasmine, 28 Apr. 1921, Harper (NY, US); Jasmine, 18 Apr. 1921, Harper (NY); gravelly bog, near Adams, 17 June 1955, F. & R. Case, C-100 (MICH), C-101, C-102 (NY); boggy rill feeding Mulberry Creek, Pletcher, 17 June 1955, F. & R. Case et al., C-103 (US); cultivated material, Canebrake-Magnolia glauca bog, Adams, grown at Saginaw, Michigan, F. & R. Case S-520, S-522 (US), S-524, S-527, S-528 (NCU), S-521, S-525, S-526 (MICH); boggy soil around springhead, with Arundinaria tecta, Magnolia virginiana, Jasmine, 19 Apr. 1973, F. & R. Case C-104 (NCU), C-105 (US). ELMORE CO.: Slightly damp sandy soil 1½ miles S. of Speigner, 14 Apr. 1934, Harper (PH); boggy depression along railroad near station, Elmore, 13 July, 1935, Wherry (PENN); approximately 1½ miles north of Elmore along railroad, damp boggy ground, specimen from a cultivated plant (Oct., 1955), collected 16 Feb. 1953, F. & R. Case, C-106 (US).

DISTRIBUTION AND ECOLOGY

This extremely rare plant is known to occur only in small, very localized colonies among the Fall Line Sand Hills of Chilton, Autauga, and Elmore Counties, Alabama, north of the Alabama River in an area roughly bounded by the Coosa River to the east, and the Mulberry River to the west. The soils there derive from rocks generally regarded as Upper Cretaceous in origin (Harper, 1922). Except for Wherry's report of *Sarracenia oreophila* at Elmore, Ala-

bama, no other *Sarracenia* is reported to grow within the range of *S. alabamensis*.

Sarracenia alabamensis occurs in somewhat sandy-gravelly bogs, usually on sloping ground, or in damp peaty or mucky soil around small spring-heads and tiny rills. It is not usually a plant of sphagnum beds although species of *Sphagnum* may occur in isolated patches nearby. The colonies we have observed are extremely small compared to those of most of the other southern species, and range from single clumps to one group of perhaps 100 plants in a 20 by 50 foot area. According to Harper's (1922) observations and our own, the following plants commonly grow with the Canebrake Pitcherplant: *Magnolia virginiana*, *Alnus* sp., *Arundinaria tecta*, *Acer rubrum*, *Rhus vernix*, *Smilax laurifolia*, *Osmunda cinnamomea*, *Pteridium aquilinum* var., *Juncus* sp., *Drosera capillaris*, *Pinguicula* sp., *Aletris aurea*, *Rhexia* sp., *Pogonia ophioglossoides*, *Rhododendron* sp., and *Calopogon tuberosum*.

The pitcher plant grows most often in open stands of *Magnolia virginiana*, *Arundinaria tecta*, and *Alnus*, in the "Canebrakes" of the region, or in open boggy swales. Tolerant of more shade than most of the trumpet-leaf sarracenias, the species nevertheless reaches its most vigorous and distinctive development when growing in full sunlight. Although few of the large, distinctive summer leaves develop on heavily shaded plants, the species is able to flower sparingly even when so shaded that not even the curved spring pitchers can develop without severe deformity.

Hardest to detect of the sarracenias, this species probably has always been very limited in distribution in modern times, for its habitat is very restricted and by nature it occurs in small stands among other plants. But recent developments within its range have caused further restriction.

In 1921, Harper (1922) reports, the bogs in which *Sarracenia alabamensis* grew were open, with woody plants rather small and scattered, the bulk of the vegetation sun-loving. It was still generally thus at both Elmore and in Chilton County when we first saw this species in 1953 and

1955. At that time the swamps were shrubby but open, and small rills lined with pitcher plants were frequent. The entire area was sparsely inhabited, remote, and the roads were limited, temporary, and unditched. In contrast, on visits in the past few years, we found much change. The bogs have not burned in some years. No longer are they open; dense stands of magnolia and maple, solid canebrakes, tangles of *Smilax*, and alder, rob the bogs of light. The sarracenia is much rarer today, and seedlings scarcely can be found. Good roads reach the area, and farms, cattle raising operations, use of herbicides, ditching and draining, all have taken considerable toll of the habitat. Perhaps the greatest change in the pitcher plant habitat here has been the invasion of the bogs and openings by the Japanese honeysuckle, *Lonicera japonica* Thunb., which destroys virtually all native species in the bogs it invades.

DISCUSSION

The Alabama Canebrake Pitcher Plant has many features of interest. It is the only trumpet leaved *Sarracenia* to produce pitchers which differ significantly in size and form with the season (Fig. 2).

The usually recurved, shorter, spring pitchers are less voluminous than the often very much larger, erect, summer pitchers. In these spring leaves, the laminar wings expand at or just below the middle, pushing the pitcher into a loosely sigmoid curve. The upper, sharply expanded part of the tube and hood is erect. In effect, these early leaves seem almost deformed, as in a plant growing under drastically shaded conditions or in one which shows the effects of an application of an herbicide. This leaf form, produced in other species only under conditions of ecological duress, is entirely normal and comprises the usual spring pitcher in this species, even on plants growing in full sun (Fig. 2). But occasionally, on extremely vigorous, uncrowded plants in very wet, sunny situations, the plant produces the large summer type pitchers without first producing the recurved leaves.

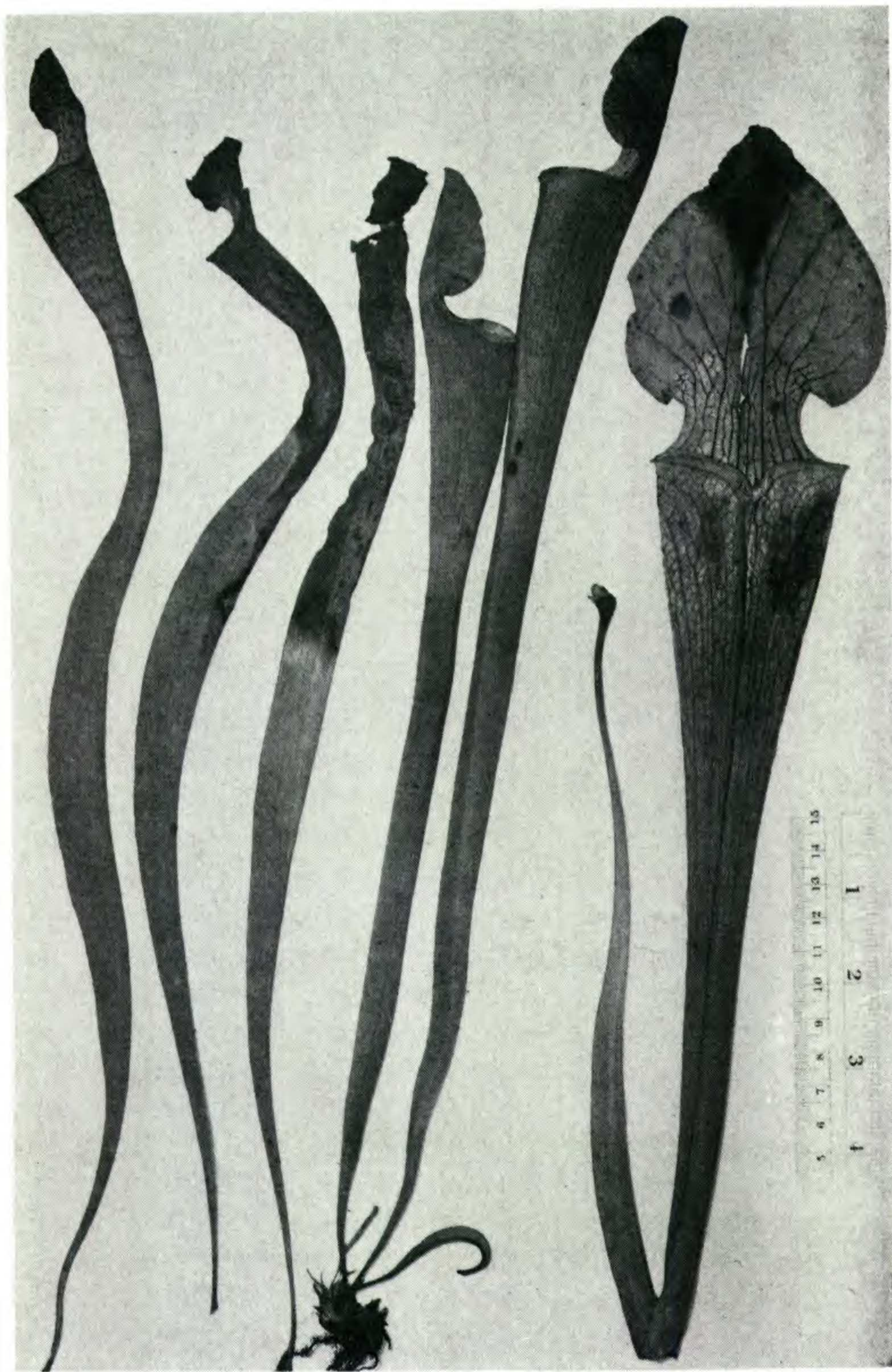


Figure 2. *Sarracenia alabamensis*. Three spring type, curved leaves (left) and three of the larger, straight summer leaves (right). Note the obscure white, areole-like markings near summit of pitcher tube on the right-hand specimen.

A single clone may produce either type of pitcher in the first wave of growth in different years, but the trend is clearly toward recurved spring pitchers. In a group of about 50 study clones grown in our greenhouses, roughly 90% of the plants will produce the recurved pitchers in a given season. In the wild, in more competitive (and perhaps darker) situations all except two of several hundred clones we have observed have produced the recurved spring pitchers. These two plants had produced only the large summer-type pitchers that season.

The variable form of the early leaves of the season, sometimes as recurved, reduced smallish pitchers with an unusual development of wing tissue, sometimes as fully developed phyllodia, and occasionally as erect, summer-type pitchers, suggests to us that these variations occur at least partly in response to a combination of degree of light intensity and increasing daylength. Phyllodia and the recurved, reduced pitchers do not reappear in the autumn; at that time only smaller, fully erect, summer-type pitchers develop.

MacFarlane (1908) has stated that phyllodia represent an advanced leaf type, developed by reduction of the superior pitcher portion of the wing while the inferior lamina remains full sized or enlarged. He notes that occasional leaves intermediate between normal pitchers and phyllodia appear in all the phyllodium-forming species. We suggest that the variable structure of the spring leaves in *Sarracenia alabamensis* represents a stage in the evolution of a laminar phyllodium from a pitcher, one in which the exact degree of pitcher reduction in response to daylength and light intensity has not yet become stabilized. The fact that these variable leaves occur only in spring and that in other species which regularly produce phyllodia, such leaves are strictly seasonal, seems to strengthen this interpretation.

The summer pitchers of the Canebrake Pitcherplant are fully erect, remarkable for their relatively large size, and great volume. The tissue of these large summer pitchers

possesses a soft substance lacking the waxy-thickened quality of the other trumpet leaf species. This, together with the fine, dense pubescence, gives to the pitcher a unique "feel," prompting Dr. Wherry to remark that this is the only "*rubra* type" *Sarracenia* one can readily identify in the dark.

Other features of the summer pitcher include its very light green color when grown in bright light, and the presence in many leaves of a few rather obscure, whitish areole-like areas scattered on the outer pitcher-tube surface near its orifice. These cannot be seen from within. These faint areoles seem to be the consequence of the extreme tissue expansion characteristic of the summer pitchers. They are not structurally quite the same as those in the truly areolate species, but they may offer interesting evidence as to the mode of origin of areoles within this genus. Because all taxa related to *Sarracenia rubra* have become controversial and because other taxa in the *rubra* alliance do not show areoles at all, some botanists may seize upon this feature as evidence that *S. alabamensis* represents a hybrid population of some sort, not a species.

We cannot regard these areole-like tissues as evidence of any recent hybridization with an areolate species for several reasons. The areolae do not appear on the spring leaves in this taxon; in the known hybrids between other areolate and non-areolate species, the areolae occur in all leaves of mature plants and even on the larger seedling leaves. In known areolate hybrids, the white transparent areoles extend from outer to inner tube tissues. Also, no areolate species occurs in contact with the known range of this species. If these areole-like formations be of hybrid origin, it is ancient hybridization and the whitish markings have become a fixed although obscure characteristic of the larger summer leaves.

Although we have already stated our interpretation of the nature of the recurved spring pitchers above, the intermittent production of full phyllodia in *Sarracenia alabamensis*, coupled with Wherry's report of *S. oreophila*

within its range at Elmore, may lead some to say that *S. alabamensis* represents a hybrid swarm of *S. oreophila* with *S. rubra*. Several points ought to be made in this connection. Since *S. oreophila* is a large yellow-flowered species, and *S. rubra* a small red-flowered one, any hybrid population ought to produce orange, or yellow and red mottled flowers of intermediate size as are reported for all other hybrids between *S. rubra* and yellow flowered species. Not one plant of our more than 50 study clones produces anything but medium to dark oxblood red small flowers. *S. rubra* Walter does not occur in the region of *S. alabamensis*. The population of *S. alabamensis* is an extremely uniform one in structure and behavior: even the variability of the spring leaf structure and the variability in occurrence of the areole-like markings on the larger summer leaves are uniform features of the species. There is none of the type of variation in leaf structure or coloration so characteristic of *Sarracenia* populations where hybridization can be demonstrated.

In an effort to ascertain whether this plant might represent a population of direct hybrid origin between *Sarracenia oreophila* and *S. rubra*, we hand pollinated a plant of *S. rubra* from Fruitdale, Ala., with pollen of *S. oreophila* from De Soto Falls, Ala. The resulting hybrid plants, grown in our greenhouse, were intermediate between the parents in leaf structure and size and produced the orange-red flowers typical of such hybrids. The hybrids did produce laminar phyllodia, but, surprisingly, these were of an erect type as in *S. leucophylla* and did not resemble closely those of either *S. oreophila* or *S. alabamensis*. Leaf coloration patterns and pitcher hood conformation were unlike *S. alabamensis*. No recurved pitcher leaves of the *S. alabamensis* spring pitcher type have appeared. We could not find justification in the structure of these hybrids for suspecting a recent hybrid origin for *S. alabamensis* involving these two possible parents.

The tendency toward phyllodia, the presence of very large summer leaves resembling more in profile those of *Sar-*

racenia flava, *S. oreophila*, or *S. leucophylla* than those of *S. rubra* which it resembles in flower and spring leaf, and the tendency to produce tissue areas resembling faint, random areolae, could be interpreted as placing this species in a central primitive position from which differing selective factors have led in one direction toward the *S. rubra* types and in another toward the phyllodium-producing groups. Its presence as a relict in an area of ancient soil derivation (Harper, 1922) in an area largely devoid of other pitcher plants suggests to us that this is a possibility.

HISTORY

In the earliest published reference to this plant, R. M. Harper (1918) referred the plant to *Sarracenia sledgeii* MacF. [*S. alata* (Wood) Wood], although he was certainly skeptical, for in his discussion of the distribution of *S. sledgeii* he says: "East of Mobile Bay, I have seen a few specimens [of true *sledgeii*] in the southern part of Baldwin County, Alabama, and what appears to be the same thing (though it may be a variety of the next [*S. flava*]) in boggy places among the long-leaf pine hills in Chilton and Autauga Counties, near the center of the State." At that time Harper had not seen the plant in flower. In April, 1921, Harper found the flowers to be small and dark red, so he identified the plants as *S. rubra* Walt., although his locality was farther inland than the known distribution of that species (Harper, 1922).

In 1932, Wherry, guided by Harper, visited some of these colonies but stated: "We located a colony of a red flowered pitcher plant but it was not in good enough condition to establish its identity" (Wherry, 1934) [Possibly Wherry's uncertainty was because of the presence of the peculiar, recurved spring pitchers which simulate pitchers deformed by shading]. In the September, 1973 issue of the *Carnivorous Plant Newsletter*, Dr. Wherry refers to this plant which he saw in our greenhouse in September 1955, after having seen it with Harper in the wild, as an "undescribed species from Alabama."

Wherry's discovery of *Sarracenia oreophila* at Elmore, Ala. represents the only known contact of the range of *S. alabamensis* with another species. At this station both species apparently grew in proximity, for both have been collected in summer leaf there and determined by various taxonomists as *S. oreophila*. The difficulty of determining certain summer plants of *S. alabamensis* from *S. oreophila* is emphasized by the fact that Wherry's July 13, 1935, Elmore, Ala. specimen (PENN), determined by both Wherry and McDaniel as *S. oreophila*, is in our opinion *S. alabamensis*. This is indicated by the small size of the flowers, dark sepals, the shape and size of the phyllodia, and in this particular specimen, smaller pitcher size than is typical of flowering-sized *S. oreophila* (see Fig. 3). The difficulty of separating all specimens of the two species without the presence of petals to indicate flower color, is further pointed up by McDaniel's comments (1966, pp. 45, 46) on the plants of the Elmore area: "... the Harper collection from Elmore County, Ala. differs in certain details of which the much reduced phyllodia seem to be the most significant. Additional collecting both in Elmore County and in the lower Coosa River Valley is needed to determine the status of this central Alabama population."

Indeed, the dissimilar spring and summer pitchers on well developed plants of *Sarracenia alabamensis* have led to much historical confusion and to determinations of or references to it in the literature in the past as *S. sledgeii*, *S. flava*, *S. jonesii*, *S. rubra*, and *S. oreophila*. Yet those who have seen vigorous living specimens agree it is distinct.

ACKNOWLEDGEMENTS

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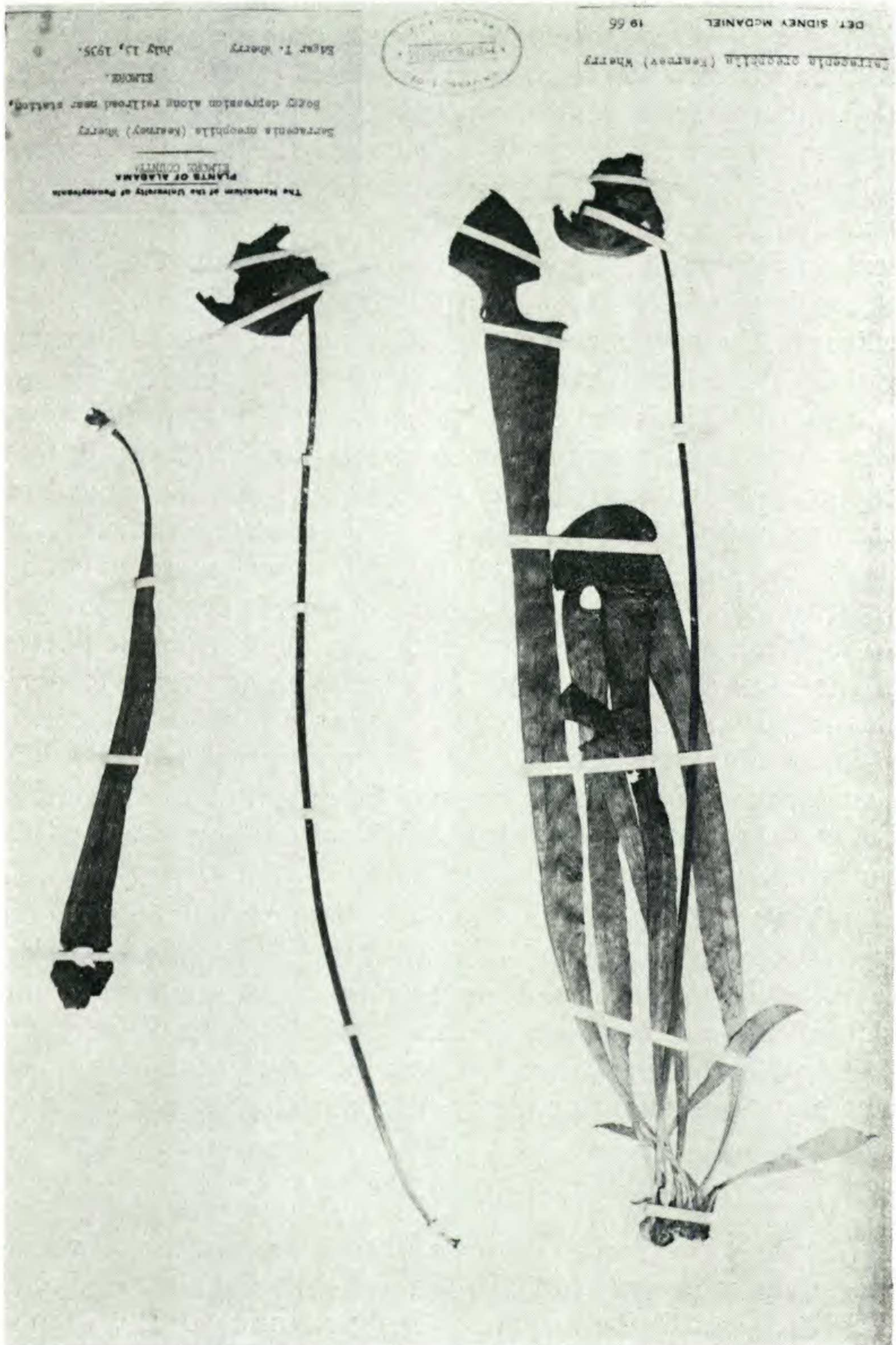


Figure 3. A specimen of *Sarracenia alabamensis* from Elmore, Ala., showing the fully reduced laminar phyllodia occasionally produced in this species which, in combination with the large summer leaves, give to this specimen a strong resemblance to *S. oreophila*.

To Dr. Rogers McVaugh, University of Michigan Herbarium, we are especially grateful for examining our manuscript, for help with several difficult points, and for preparing the Latin description.

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